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Smith:

on Amputation of the
Hip joint, 1852

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ART. III.—*Statistics of the Operation of Amputation at the Hip-Joint.* BY STEPHEN SMITH, M. D.

WHILE engaged recently in collecting some of the statistics in relation to amputation at the knee-joint, I directed my attention also to the same operation when performed at other large articulations. It was not until I had nearly completed the collection of the published cases of amputation at the hip-joint, that I had an opportunity of consulting the Memoir of Mr. Sands Cox upon the same subject, and there learned for the first, that this gentleman had made a similar collection for a

somewhat similar purpose. Here my labors would have ceased, but for the reflection that this collection contained some errors, that it has now been published several years, during which several cases have been reported, but principally that its foreign and expensive form of publication almost wholly excludes it from the profession in this country. I am chiefly indebted to this Memoir for reference to several cases, and for the date at which some operations were performed.

Amputation at the hip-joint was first noticed by the elder Morand, and subsequently brought prominently before the Academy of Surgery of Paris, by his students, Wholer and Pauthod, as early as 1739. In 1743, Ravaton proposed to perform this operation on a person suffering from a gun-shot wound of the thigh, but was overruled by his colleagues; in 1748, La Croix disarticulated the femur at the hip-joint, at the Hotel Dieu d'Orleans, for the first time in the history of modern surgery. In this case, the thigh was separated at its coxo-femoral articulation by gangrene, except the round ligament and sciatic nerve, requiring only that these should be divided with scissors to complete the operation. This patient went on favorably for several days, but fever supervening, he died on the fifteenth day. Barbet, whose essay received the prize offered by the Academy of Surgery in 1759, in regard to the propriety of this operation, founded his opinion in favor of it, in some degree upon this case. The second recorded case, and the first which proved successful, was performed by Per-rault, of St. Maure, Tourraine, in 1773.* This was also a case of gangrene, extending nearly to the pelvis. In the following year Kerr, of Northampton, performed this operation, for the first time in England. About the same time, Mr. H. Thompson of the London Hospital, is supposed to have amputated at the hip-joint, but nothing satisfactory can be learned either in regard to the date or result of the operation. It is from the uncertainty of this case, that early English writers have asserted that this operation was first performed in England, and S. Cooper, (*Dict. of Surg. Art. Amput.*) labored under the

* SABATIER, *Médecine Opératoire*, t. iv. p. 542. *Medical and Physical Commentaries*, vol. iv.

still greater mistake of supposing that Kerr's case was the second ever performed. Mr. South has given due credit to the French operations.*

Previously to 1800, this operation had been performed fifteen times, of which six were reported as successful; the recoveries to the deaths being as two to three, or a mortality of sixty per cent. Of these fifteen cases, all but two were performed by French surgeons; excluding the two English cases, both of which were unsuccessful, and the ratio of recoveries to the deaths stands as six to seven, or a mortality of nearly fifty-four per cent. In two-thirds of these examples the operation was performed in military practice, four proving successful to six fatal. These results had the effect to direct attention strongly to the operation, and during the twenty years subsequently to 1800, it became of much more frequent occurrence, although the ratio of mortality was very considerably increased. During this period there were performed twenty-four operations, of which eighteen proved fatal, giving a mortality of seventy-five per cent. Of this number six occurred in continental practice, having a ratio of recoveries to deaths of one to five, or a mortality of over eighty-two per cent; seventeen occurred in English practice, of which four were successful; giving a mortality of over seventy-six per cent. The remaining one case was contributed by this country, and was successful. The operator was Dr. Walter Brashear, then of Kentucky, but recently of New Orleans; this was the first case of amputation at the hip-joint performed in this country, and has the additional merit of being successful.

During the next twenty years, ending with 1839, there are reported forty-two cases, of which twenty-nine were fatal, eleven successful, and two doubtful; admitting the doubtful among the fatal, and they give a mortality of nearly seventy-four per cent. The mortality of the operations on the Continent for this period, was over eighty-three per cent.; in British practice about fifty-four and one-half per cent., and in this country fifty per cent. American practice contributed two cases, one successful, and one fatal.

* SOUTH'S CHELIUS, vol. iv.

During the last twelve years, the number of operations reported is twenty-one, of which eighteen were successful and three fatal, being a mortality of a little over fourteen per cent. For this period Continental practice contributes seven operations, all successful; British practice seven operations, and six successful; American practice, eight operations, and six successful.

In reviewing the history of this operation thus briefly sketched, it will be seen that the per centage of mortality has not gradually diminished from the earliest introduction of the operation, but quite abruptly. Thus for the twelve years previously to 1840, there were twenty-nine cases reported, of which six were successful, and twenty-three fatal, being a mortality of over seventy-nine per cent.; while for the twelve years subsequently to that date, as already noticed, the mortality was reduced to but fourteen per cent. It is difficult to account for this feature in the history of the operation, except in a general way; for the ratio of accidents and injuries to chronic diseases of the thigh, remains nearly the same in both periods. We may suspect, however, that the cases were better selected, that the operation was more skilfully executed, and above all, that much is due to the employment of anæsthetics.

It does not enter into the design of this paper to discuss the merits of the different methods adopted to perform the operation; but it may not be uninteresting to some, in this connection, to allude to them in a general way. They are, for the most part, but modifications of the three operations which have been practised in amputation in the continuity of the thigh, viz., *the flap*, *the circular*, and *the oval*. The *flap* may be *single* or *double*; when single it may be *posterior*, *anterior*, *internal*, or *external*; when double they may be *anterior and posterior* or *internal and external*. The *circular* operation was first introduced by Abernethy, and has been adopted by several eminent surgeons, but in no instance where it has been followed has the case terminated successfully. Professor Brainard is the only operator in this country who has adopted this method, so far as the history of the several operations have been given, and his case terminated fatally, after repeated hemorrhages, in about six weeks subsequently to the opera-

tion. The *oval* method, deduced by Scoutetten from Guthrie's operation, which was a combination of the double flap and oval, has been but rarely practised on the living subject. According to Velpeau, M. Baudens adopted it in his successful case, but it is elsewhere differently reported. These three principal operations and their divisions and subdivisions, have been still farther modified by successive operators, until the whole forms a chapter of tedious and uninteresting minutiae, in regard to an operation which admits of so few important variations.

Of these several methods, that of the double flap has been much the most frequently practised, formerly with internal and external, but latterly with anterior and posterior flaps. It may be said of this operation, although no test of its merit, that in all the successful cases where the details of the operation have been given, this method has, with a single exception, been followed. The plan of placing a ligature around the femoral artery before proceeding to the amputation, once considered very essential, is now abandoned for compression. But, doubtless, the most important improvement, and that which will tend more strongly than all others to reduce the mortality of this, as of all severe operations, is the introduction of anæsthetics into surgical practice. The first case in which they were employed in amputation at the hip-joint was that of M. Hénot, in 1847, which was successful, the patient having inhaled ether. M. Guersant first used chloroform, and with the most favorable results; more recently it has been employed by Mr. Wigstrom and Drs. Van Buren and Bradbury in their successful cases. Dr. May made use of chloric ether in his operation with similar success.

The improvements in this operation, which have been suggested by American as well as foreign operators, are based upon the opinion of Mr. Guthrie, "that the success of the operation depends very much upon the quickness with which it is performed, not on account of hemorrhage, but to avoid the shock the constitution receives from the continued exposure and irritation of so large a surface in the immediate vicinity of the trunk of the body."* Dr. Mott modified Larrey's

* GUTHRIE'S *Treatise on Gun-Shot Wounds*, p. 364, 3d edit. Lond. 1827.

method by cutting from without inwards in making the external flap. Ashmead, of Philadelphia, slightly modified the operations of Plantade and Manec, the double flap method, the flaps being made anteriorly and posteriorly.

Dr. Van Buren describes his method as "nothing more than a modification of Liston's operation with anterior-posterior flaps, in which the posterior flap is made by cutting from without inwards towards the bone, instead of in the opposite direction, the disarticulation of the thigh being left to the last." He believes, "from repeated trials, that this operation could be invariably done in less than a minute by the most unpractised hand at all accustomed to surgical operations, and by a little practice in less than half the time mentioned, as was the case with my patient." Dr. Mott, who was present at the operation, expressed an opinion favorable to the method adopted. The operation here ascribed to Mr. Liston is that of Bèrlard's.

Professor May remarks of his operation, "that which I selected was the double flap operation (the anterior and posterior flap), as recommended by Bèrlard, with a slight modification of my own, viz., that of introducing the knife at the inside just above the tuberosity of the ischium, instead of at the outside, below the spinous process of the ilium." He prefers this method "from the facility and security with which the hemorrhage can be commanded;" and because "this operation can be performed with greater celerity than by any other mode of amputating at the hip joint." The extent of surface divided is so great, and the vessels (independent of the femoral) so numerous, that any delay or bungling in the operation might and probably would compromise the life of the patient. I have no doubt that it has happened more than once, that he has died on the table from hemorrhage, when the shock to the system has been made to bear the blame."

Dr. Bradbury operated according to the same method as above given, but modified in the following manner: "When about to form the posterior flap, it was observed that the great enlargement of the limb, the indurated and consolidated condition of the tissues to near the base of the first incision, would constitute a barrier to the introduction and passage of the

knife around the femur, so as to embrace all the remaining tissues, and give the flaps the dimensions desired. The knife was, therefore, introduced in nearly a perpendicular direction, on the external side of the bone, and carried out posteriorly, splitting the posterior flap in the middle; then in like manner on the inside of the bone, making three flaps, the two last of nearly equal size, an external lateral flap, a posterior and an anterior." This method furnishes a very pending and accessible channel for the exit of the ligatures and secretions. The greater flexibility of the flaps favored a more perfect coaptation to each other, and to the cavity of the acetabulum, leaving less space to be filled by granulations, and consequently was more favorable to union by the first intention; and, again, it is accomplished with great facility. A more perfect adaptation of parts, or a more symmetrical stump, it is not easy to conceive."

If we may be allowed to venture an opinion, from an attentive consideration of the facts here presented, we should say that "*quickness*" in the performance of this operation, as a point to be studied, is as ill-advised as it would be in any other severe and dangerous operation in surgery. The dangers from hemorrhage certainly have no existence in practice; on the contrary, in two cases at least, in which there was a troublesome oozing of blood, the wound was exposed to the air for some time, as in other amputations, with the effect to stop the bleeding and dry the wound. Mr. Guthrie, by a slight mis-quotation of the above extract from his work, has been made to advise a quick operation from the fear of hemorrhage. Such is not, however, the opinion of that surgeon; and he elsewhere states very positively, that "the danger arising from loss of blood is proved to be trifling, and no bad consequence has ever resulted from it." The second reason, that a "quick" operation will obviate the danger from a shock to the system, is not less tenable; for, in the first place, as these cases sufficiently attest, patients very rarely indeed die of the primary effects of the operation, but remotely from an extension of the disease, or some complication foreign to the operation; and, secondly, in at least three of the most successful cases the operation was purposely prolonged, in one

to check hemorrhage if it should occur, and in the other two to stop the oozing by exposure of the wound to the air. The congratulations of the friends of Mr. Syme on the celerity with which he first disarticulated the thigh, compared with the slow operation of Sir Astley Cooper, must have been turned to bitter irony when he compared the fatal result in his own with the successful issue in Sir Astley's case. Mr. Guthrie, who first gave currency to the opinion from which we here dissent, remarks, "the shock to the constitution or system at large, although undeniably great, has been proved not to be beyond its powers of supporting." A reviewer in the *Dublin Quarterly Journal* believes that the cause of death in amputation at the hip-joint, is neither the loss of blood by hemorrhage or the shock to the system, because death usually follows the operation too remotely; "but the abstracting so much in the limb, being one-fourth or fifth of the entire blood in the body, while the viscera still continue to act as though none were removed." As we discover among the causes of death in no instance the tardiness with which the operation was performed, although this is a marked feature in several cases of recovery, we must conclude that the rule still has universal application in operative surgery, "whatever is well done, is quickly done."

AMPUTATIONS IN

SEX.	AGE.	DISEASE OR ACCIDENT.	CONDITION.	DATE AND RESULT.
1. M.	14.	Gangrene of both lower limbs from eating diseased rye.	Suppuration had disarticulated right thigh except the round ligament and sciatic nerve.	1748. Died.
2. M.	21.	Right thigh crushed between pole of carriage and wall.	Gangrene and sloughing to a frightful extent, and thigh nearly disarticulated.	1773. Cured.
3.		Gun-shot wound and fracture of the femur.		1793. Died on third day.
4. M.		Compound fracture of thigh from a gun-shot.		1794. Cured.
5. M.		Compound fracture of thigh from a gun-shot.		1794. Cured.
6. M.				1794. Died on 58th day.
7. M.		Compound fracture of thigh from a gun-shot.		1798. Cured.
8. F.	13.			1798. Cured.
9. M.		Fracture of the femur from the bursting of a bomb-shell.		1799. Died.
10. M.		Fracture of femur and severe injury of right thigh from bursting of a bomb-shell.	Femoral artery was torn, and he lost considerable blood.	1799. Died on 7th day.
11. M.	20.	Right thigh carried away at its middle by a splinter of a bomb-shell.	Fracture of femur, extended as far as joint; soft parts bruised and disorganized; in extreme pain.	1799. Died.
12. M.		Very extensive gun-shot wound of thigh with fracture of bone to trochanter.	Suffered severe pain; begged to have the operation performed.	1809. Died in 3 hours.
13. M.		Same injuries as number 12.	Symptoms and condition as number 12.	1809. Died in several hours.
14. F.	7.	Tumor of the thigh.	Patient scrofulous; tumor very large and painful.	1812. Cured.

CONTINENTAL PRACTICE.

OPERATION.	REMARKS.	AUTHORITY.
Separated the attachments with scissors.	Four days after, amputated the left thigh, did well to tenth day, fever set in, she died on the fifteenth day. Convalesced without any unfavorable symptoms; seen twenty years after.	LA CROIX. <i>Sabatier, Méd. Op.</i> , tom. iv., p. 672. M. PERAULT. <i>Sabatier Méd. Op.</i> , tom. iv., p. 672.
Lateral flaps.	Operation performed without accident, relieved; had to undergo a journey of twenty-four hours in winter, which proved fatal.	M. LARREY. <i>Mem. of Military Surgery</i> , vol. ii.
Lateral flaps.		M. BLANDIN. <i>Mott's Velpeau</i> , vol. ii. p. 638. M. BLANDIN. Ditto. M. BLANDIN. Ditto. M. PERRET. <i>Mott's Velpeau</i> , vol. ii, p. 638. M. MULDER. <i>Cyclop. Pract. Surg.</i> , part iv., p. 182.
Lateral flaps.	Passed several hours comfortably, but was obliged to undergo a hurried journey of twenty-four hours, in the winter, after which he sunk and died.	M. LARREY. <i>Memoirs of Military Surgery</i> , vol. ii.
Lateral flaps.	For six days seemed in a fair way for recovery; took the plague, and on the seventh day died, the stump becoming gangrenous.	M. LARREY. Idem.
Lateral flaps.	Relief to his sufferings followed; was obliged to be moved with the army, and died on the road.	M. LARREY. Idem.
Lateral flaps.	Patient was in a prostrated condition; pulse scarcely perceptible.	M. LARREY. Idem.
Lateral flaps.	Operation as in number 12, was performed at the solicitation of patient, and contrary to opinion of operator.	M. LARREY. Idem.
Compressed the artery; lateral flaps.	Wound healed; health reestablished; about to be discharged when she was seized with diarrhœa, and died three months after operation.	M. BAFFOÏ'S <i>Bulletin de la Faculté de Médecine</i> , tom. viii., 1812.

SEX.	AGE.	DISEASE OR ACCIDENT.	CONDITION.	DATE AND RESULT.
15. M.		Very extensive gun-shot wound of thigh; comminuted fracture of bone.	In favorable condition.	1813. Died on 29th day.
16. M.	25	Enormous encephaloid tumor of thigh, extending above the trochanter.	Emaciated, suffered constant and severe pain; tumor elastic, but not fluctuating.	1820. Died in 9 weeks.
17. F.	50	Necrosis of femur—with abscesses.	Discharge of bone through fistulous passages; severe pain.	1821. Died on 12th day.
18. F.	42	Cancerous tumor of thigh.	Dangerous hemorrhage in attempting to extirpate the tumor.	1824. Died on 9th day.
19. M.	34	Necrosis of femur existing nineteen years.	Abscess formed, resulting in fistulas, which had long existed.	1824 Cured.
20. M.	21	Tumor grew on thigh-bone, was fractured and untreated.	Extensive suppuration, emaciation, hectic; in a sinking and destitute condition.	1824. Died on 11th day.
21. M.		Comminuted fracture of the thigh-bone.	Fragments passed each other with muscle between the extremities.	1827. Cured.
22. M.	26	Scrofulous disease of thigh following injuries.	Scrofulous habit; pale, feeble, sickly appearance.	1831. Died on 14th day.
23. F.	25	Caries of knee followed by necrosis of femur.	Extensive suppuration and great suffering.	1832. Cured.
24. F.	15	Malignant tumor of knee and thigh, with spontaneous fracture of femur.	Great suffering and failing health.	1832. Died on 11th day.
25. F.	26	Immense osteo-sarcomatous tumor of thigh.	Fluctuating in some parts; in others of cartilaginous hardness; superficial veins greatly dilated.	1834. Died on 20th day.
26.	13	Osteo-sarcoma of thigh.	Scrofulous habit of body.	1834. Died on 13th day.
27.		Fracture through trochanters.	Extensive suppuration; emaciated; symptoms of sinking.	1834. Died in 10 hours.
28. M.		Gun-shot wound of thigh and fracture of trochanter.	Great exhaustion from previous suppuration.	1835. Died during operation.

OPERATION.	REMARKS.	AUTHORITY.
Lateral flaps.	Ligatures had come away, cicatrization to some extent, when he was imprudent in diet, had fever and dysentery which proved fatal.	M. LARREY. <i>Memoirs of Military Surg.</i> , vol. iii.
Lateral flaps; first tying artery.	Severe hemorrhage, which had to be controlled by styptic powders; slowly convalesced; cicatrization did not commence in two months; was imprudent in diet.	M. PELIKEN. <i>Med. Chir. Trans. of the Imperial Acad. of Wilna</i> , 1839.
Lateral flaps; first secured the artery.	Severe hemorrhage followed; violent fever, wound opened; profunda artery arose above Poupart's ligament.	M. PORCIENKO. Ditto.
Ligated artery to stop hemorrhage, then amputated at hip joint.	Had tetanic spasms on ninth day; wound did not unite; cancer was found in lungs and pleuræ.	M. GERDY. <i>Bulletin Gén. de Therap.</i> , 1835.
First secured the artery; lateral flaps.	Found great difficulty in bringing the flaps over the articulation; union nearly complete on eighth day; cure complete in six weeks.	M. DELPECH. <i>Revue Médicale</i> , Sept. 1824.
Lateral flaps.	Did well for a time, but an ulcer on sacrum became gangrenous, and he died of exhaustion.	VON WALTHER. <i>Graef et Walther Jour.</i> , vol. vi.
First secured the artery; single flap on inside of the thigh.	Union by first intention; six months afterwards symptoms of chronic peritonitis occurred which proved fatal.	M. DELPECH. <i>Jour. Gén. de Méd.</i> , 1828.
Anterior and posterior flaps.	Did not wish union by first intention; bone soft and of a reddish appearance on section.	M. VELPEAU. <i>London Med. Gaz.</i> , vol. viii.
Compressed artery; lateral flaps.	Intended to amputate thigh, but found bone too much diseased; cicatrization nearly complete on fiftieth day.	Prof. JAEGER. <i>Zeitschrift für die gesammte Méd.</i> , Band. 3.
Ligated artery first; lateral flaps; tied femoral vein.	Did well for a time, symptoms of phlebitis arose which proved fatal.	M. BLANDIN. <i>Transactions Médicales</i> , vol. x.
Compressed the artery; circular operation.	Following day had fever and diarrhœa; got better; on eighth day union had commenced; on fifteenth day very favorable. Extensive suppuration; death followed from exhaustion. Patient bore operation well; lost but little blood; pulse grew feeble and surface cold; died 48 days after accident.	KORSENIIEWSKI. <i>Med. Clin. Trans. of Imperial Acad. of Wilna</i> , 1839. DIEFFENBACH. <i>London Lancet</i> , 1834-5. DIEFFENBACH. <i>Jour. Univers. des. Sci.</i> , vol. xlviii.
Lateral flaps.		M. ROUX. <i>Gazette des Hopitaux</i> , 1830.

SEX.	AGE.	DISEASE OR ACCIDENT.	CONDITION.	DATE AND RESULT.
29. M.	17	Fungous tumor of periosteum in upper part of thigh.		1835. Died several days after operation.
30. F.		Fracture of femur from a gun-shot wound.	.	1835. Died in several days.
31. M.	24	Fracture of femur from a gun-shot wound.		1836. Cured.
32. M.	28	Compound comminuted fracture of thigh.	Extensive suppuration.	1840. Cured.
33.		Gangrene of stump followed amputation at knee-joint.	Gangrene extending up thigh.	1841. Cured.
34. M.	26	Large exostosis of right femur extending as high as trochanter.	Abscesses formed and fistulous passages; great suppuration and hectic symptoms.	1847. Cured.
35. M.	5	Cancerous affection of femur.		1848. Cured.

AMPUTATIONS IN

1. F.	12	Disease of right hip-joint.	Emaciated; suffering symptoms of hectic, suppuration of joint.	1774. Died on 18th day.
2. M.		Gun-shot wound, with fracture of femur.		1812. Cured.
3. M.		Gun-shot wound, with fracture of femur.	Several months after had caries, with suppuration; hectic, and emaciation.	1814. Died on 30th day.
4. M.		Thigh crushed by machinery.		1814. Died on following day.
5. M.		Fracture of femur from gun-shot.	In a very unfavorable condition.	1814. Died in 24 hours.
6. M.		Gun-shot wound.	In a very bad state.	1814. Died on 8th day.
7. M.		Sloughing and hemorrhage after amputation of thigh for gun-shot wound.	Great prostration; ligature of femoral artery did not prevent bleeding.	1814. Died in 7 hours.

OPERATION.	REMARKS.	AUTHORITY.
Ligated the artery; lateral flaps.	Articulation found to be healthy.	M. ROUX. <i>Nouv. Bibl. Méd.</i> , 1830.
		CLOT BEY. <i>Gazette des Hopitaux</i> , tom. iv.
Anterior and posterior flaps, according to Bécларd.	Convalescence complete in forty days.	M. BAUDENS. <i>Lancette Francaise</i> , 1836.
Single anterior flap; used twenty-two ligatures.	Discharged cured in about ten weeks.	M. SEDILLOTT. <i>Memoires de Chirurgie</i> , t. 1.
	So far recovered at the end of four months as to be able to walk about.	M. TEXTOR. <i>Gaz. Médicale de Paris</i> , 1841.
Anterior and posterior flaps, according to Bécларd, but modified.	Ether was administered; four-fifths healed by first intention; convalescence complete on 90th day.	M. HENOT. <i>Archiv. Gén. de Med.</i> , 1847.
	Cure complete in twenty-two days; chloro- form successfully administered.	M. GUERSANT. <i>Jour. de Med. et de Chi- rurg. Prat.</i> , 1848.

BRITISH PRACTICE.

First incision from great tro- chanter backwardly to inside of thigh; second forward; artery divided and tied.	Acetabulum carious; lungs almost totally re- duced to matter, especially on the right side; an abscess in abdomen opening into joint.	Mr. KERR. <i>Ed. Med. and Philosoph. Com.</i> , vol. vi., 1779.
	Was seen after three years enjoying perfect health.	Mr. BROWNRIGG, <i>Guthrie on Gunshot Wounds</i> , London, 1827.
Laid bare artery and tied it; lateral flaps.	Had two attacks of hemorrhage from stump; condition very variable, and finally died of irritation and exhaustion.	Dr. EMERY. <i>Guthrie on Gunshot Wounds</i> , London, 1827.
	Operation performed immediately.	Mr. BADLEY. <i>Cox's Mem. on Ampu. at Hip Joint</i> .
Circular incision, as if to amputate thigh, then cut up on joint.		Mr. COLE. <i>Cooper's Surg. Dict.</i> , Art. Ampu.
		Mr. Blicke. <i>Guthrie on Gunshot Wounds</i> .
Applied fourteen ligatures; lateral flaps.	Profunda given off from external iliac; femo- ral perfectly open where ligated; last hemor- rhage from small branches of profunda.	Mr. GUTHRIE. <i>Work on Gunshot Wounds</i> .

SEX.	AGE.	DISEASE OR ACCIDENT.	CONDITION.	DATE AND RESULT.
8. M.				1814. Died on 8th day.
9. M.		Gun-shot wounds, and fracture of cervix femoris.	Exhausted; wound sloughing, ulcer on sacrum.	1815. Cured.
10. M.				1815. Died in 40 hours.
11. M.				1815. Died.
12. F.	19	Osteo-sarcoma of immense size.	Tumor involved nearly whole thigh; firm, pale, covered with enlarged veins.	1819. Died on 6th day.
13. M.	40	Disease of femur as high as trochanter, following amputation of thigh.	Stump very painful; rapidly swelling.	1824. Cured.
14. M.	17	Necrosis of femur with extensive suppuration.	Much exhausted with long continued suppuration, (two years), thigh greatly swelled, painful; emaciated.	1823. Died after 8 weeks.
15. M.	25	Disease of knee, with caries of femur and a spontaneous fracture.	Leg became strongly flexed; extensive suppuration, with emaciation, hectic, and sinking.	1826. Cured.
16. M.	23	Gun-shot wound of thigh, and fracture of femur.	Vessels of thigh uninjured.	1827. Cured.
17.		Fracture of femur from knee joint, head of the bone.	Soft parts in a diseased condition.	1829. Died on 2d day.
18. F.	2	Compound fracture of femur at upper third	Severe laceration of soft parts; artery torn but no bleeding.	1831. Cured.
19. M.		Compound fracture of femur by machinery.	Collapsed; thigh stripped of its integuments from knee to groin; lower portion of femur crushed.	1835. Died in 30 hours.
20. F.	22	Thigh had been amputated for long-continued pain of knee; pain returned in stump.	Nerve was resected, but with only temporary relief; nerve contained hard bodies; suppuration occurred, which relieved pain temporarily.	1836. Cured.
21. M.	26	Osteo-medullary sarcoma of femur.	Suffered severe pain for six years.	1843. Cured.

OPERATION.	REMARKS.	AUTHORITY.
Lateral flaps.	This patient died of fever, which had no connection with the operation. Reported nearly well at the end of eighteen weeks.	Mr. BROWNRIGG <i>Guthrie on Gunshot Wounds.</i> Mr. GUTHRIE <i>On Gunshot Wounds.</i> Mr. BROWNFIELD. <i>Cooper's Lectures, London Lancet, 1824.</i>
Compressed the artery.		Mr. BROWNLEY. <i>Cooper's Lect., London Lancet, 1824.</i>
Artery compressed; lateral flaps.	The symptoms following operation were mild, slept well; wound enlarged very much with a tumor, which proved to be a cancerous degeneration of the muscle.	Mr. CARMICHAEL. <i>Trans. of Fellows of King's and Queen's Coll. of Phys., Ireland, vol. iii.</i>
Compressed artery; lateral flaps; applied four ligatures.	Operation performed very slowly; waited for hemorrhage to occur.	Sir A. COOPER. <i>London Lancet, vol. ii., 1824.</i>
Compressed artery; lateral flaps; used twelve ligatures.	Was greatly prostrated; suffered from irritability of stomach and diarrhœa; improved, wound nearly healed at end of a month, attacked with ascites, and died in eight weeks; liver enlarged, other organs healthy.	Mr. SYME. <i>Edin. Med. and Surg. Jour., vol. xxi.</i>
Single internal flap owing to diseased condition of integument; applied twelve ligatures.	Fainted during operation; suffered from diarrhœa, irritation of stomach; nearly well in six weeks; in robust health at end of three months.	Mr. ORTON. <i>Medico-Chirurg. Trans., vol. xiii.</i>
Lateral flaps; compressed the artery.	Flow of blood continued after ligature of vessels; ceased upon lengthened exposure to the air; convalescent in six weeks.	Mr. BRYCE. <i>Glasgow Med. Jour., Aug. 1830.</i>
Lateral flaps.	Lost but little blood; suffered severely from the shock of the operation.	Mr. LISTON. <i>Lond. Med. Gaz., vol. iii.</i>
Compressed artery; lateral flaps.	Operation was performed immediately; child became pulseless at close of operation, but reaction soon came on, and she gradually recovered; cure complete in five weeks.	Mr. MACFARLANE. <i>Clin. Reports of Surg. Cases at Glasgow Roy. Infr., 1832.</i>
First secured artery; anterior and posterior flaps.	The boy was of a scrofulous habit; lost a large quantity of blood before the operation, which prostrated him very much.	Mr. SMITH. <i>London Med. Gaz., vol. xvi.</i>
Ligated artery high up.	Severe prostration followed the operation; reaction came on, and she perfectly recovered; no disease of knee existed, but a neuralgic condition of the nerves of that limb.	Mr. MAYO. <i>London Lancet, 1836-7.</i>
Anterior and posterior flaps.	Left hospital six weeks after operation; wound healed by first intention; four months after died of a malignant disease, beginning as a tumor in hypochondrium.	Mr. HANDYSIDE, <i>London and Edin. Monthly Jour., 1845.</i>

SEX.	AGE.	DISEASE OR ACCIDENT.	CONDITION.	DATE AND RESULT.
22. F.	23	Disease of the stump of the thigh, which had been previously amputated.	Stump covered with fungous excrescences, tender and painful; has constant aching pain in the stump; general health good.	1844. Cured.
23. M.	31	Disease of right knee for eighteen months, following an injury.	Abscesses formed with free suppuration; knee became disorganized; an irregular form of bone could be traced along the whole extent of femur, and was considered malignant.	1846. Cured.
24. M.	24	Fracture of both legs from fall of a bank of earth; dislocation of ankle; amputated thigh; necrosis followed.	Attempted to save both legs; went on well for some days, but was seized with symptoms of phlebitis, got better, but suppuration followed; began to sink.	1848. Cured.
25. M.	18	Disease of eight years standing, extending from ankle to knee, and finally to femur with caries.	Extensive suppuration, involving thigh nearly to the hip; great emaciation, with symptoms of hectic and danger of sinking.	1849. Cured.

AMPUTATIONS IN

1.				1806. Cured.
2. M.	10	Fracture of right femur, improperly managed.	Extensive caries of femur; suppuration free, hectic symptoms; thigh resembled spina ventosa.	1824. Cured.
3. M.	25	Tumor of left thigh following fracture of the femur.		1837. Died 7 weeks after operation.
4.	child	Coxalgia.		1846. Cured.
5. M.	22	Thigh severed by rail-road cars.		1847. Died same day.
6. M.	23	Compound fracture of cervix femoris, by a musket ball.		1849. Died on 2d day.
7. M.	43	Osteo-cartilaginous exostosis of femur.	Nearly two years previously the thigh had been amputated for the same disease; after a year it returned with severe symptoms.	1850. Cured.

OPERATION.	REMARKS.	AUTHORITY.
Anterior and posterior flaps ; used the horse-shoe compressor.	Nothing worthy of note occurred during convalescence ; discharged at the end of about three months ; six months after was in robust health.	WM. S. COX, Esq. <i>Mem. on Ampu. of Thigh at Hip-Joint</i> , Lond., 1845.
Applied the horse-shoe compressor ; anterior and posterior flaps.	Slight oozing continued, and the wound was re-opened ; no artery found ; became collapsed, finally rallied, and was discharged cured on the sixtieth day ; became very fat ; disease in periosteum.	MR. J. WHIPPLE. <i>London Lancet</i> , 1846.
Anterior and posterior flaps ; applied twenty-one ligatures.	Upon amputating the thigh, the bone had an ivory hardness, and the veins were thickened ; wound did not heal, nor did the exposed bone exfoliate.	MR. SYME. <i>Monthly Journal of Med. Sciences</i> , 1848.
Anterior and posterior flaps.	Recovered without any unfavorable symptoms, but two ounces of blood lost ; patient under the influence of chloroform.	MR. WIGSTROM. <i>London Lancet</i> , April, 1850.

AMERICAN PRACTICE.

Tied femoral and profunda arteries, the latter having a high origin ; lateral flaps ; seventeen ligatures. Made circular incision ; compressed artery ; applied seven ligatures ; patient depressed by fear.	This case is also noticed as the first operation of the kind in this country, in the Report of the Committee on Surgery of the Am. Med. Assoc. <i>Vide Transactions</i> , &c. vol. iv Suffered from general irritation ; in eight days two-thirds of stump was healed ; in ten weeks cure was complete.	DR. BRASHEAR. <i>New Orleans Med. and Surg. Jour.</i> , vol. ii. DR. MOTT. <i>Phil. Jour. of Med. and Phys. Sci.</i> , vol. v., N. S. DR. BRAINARD. <i>Am. Jour of Med. Sci.</i> vol. xxii. DR. DUFFY. <i>Gibson's Surgery</i> , 8th ed. vol. ii., 1850.
Lateral flaps.	This case occurred in the New-York Hospital.	DR. BUEL. <i>Am. Jour. of Med. Sci.</i> July, 1848.
Lateral flaps.	This case also occurred in the New-York Hospital.	DR. LENTE. <i>Trans. Am. Med. Ass.</i> vol. iv., 1851.
Anterior and posterior flaps, the latter being made by cutting from without inwards towards the bone.	Chloroform was administered with the best results ; exhibited no signs of shock from operation ; nine-tenths of wound united by first intention.	DR. VAN BUREN. <i>Trans. of N. Y. Acad. of Medicine</i> , vol. i.

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SEX.	AGE.	DISEASE OR ACCIDENT.	CONDITION.	DATE AND RESULT.
8. M.	37	Scrofulous degeneration of knee and femur.	Great prostration; soft parts diseased and œdematous to groin; free suppuration.	1850. Cured.
9.				1851. Cured.
10. M.	10	Progressive disease of thigh after amputation; osteo-sarcoma following a severe injury of knee.	Strumous habit; long existing suppuration of thigh; emaciation; life threatened.	1851. Cured.
11.				Cured.

Summary of Cases occurring in Continental Practice.—

Whole number of operations, 35, of which 14 were successful, and 21 fatal; being a mortality of 60 per cent. *Sex*, 24 males, 7 females. *Age*, varying from 5 to 50. *Causes*, 17 were for severe injuries, of which 12 were gun-shot wounds; 7 recovered and 10 died; 16 were some chronic form of disease, involving extensive suppuration and constitutional deterioration; of these 6 recovered and 10 died; 2 not given.

Four died within 24 hours, of which 2 were in military service, amputation being performed at their own request contrary to the surgeon's wish; 2 were exhausted from previous disease; 1 died on the third day after a journey of twenty-four hours; of the remainder, 1 had the plague; 1 phlebitis; 2 sunk from exhaustion; 2 from imprudencies in diet had fever and dysentery; 1 fever; 1 tetanus; 2 doubtful. Of those whose time of death is uncertain, 1 died while being removed with the army; 1 died of fever. Anæsthetics were used in two cases, both successful; in one ether was employed, in the other chloroform.

In addition to the cases given in the tables, the following are

OPERATION.	REMARKS.	AUTHORITY
Anterior and posterior flaps, first made by entering knife just above tuberosity of ischium, and emerging nearer ant. sup. process than trochanter; compressed artery in this flap.	Chloric ether administered very successfully; operation performed in thirty seconds; discharged in about four months in excellent health; acetabulum sound; femur greatly diseased.	Dr. MAY. <i>Am. Jour. of Med. Sci.</i> 1851. <i>Trans. of Am. Med. Assoc.</i> , 1851
Anterior and posterior flaps, the latter of which was divided, making three flaps.	This case is reported to have occurred in Washington Co., Maryland.	Drs. RICHARDS AND CLAGGETT. <i>Rept. of Com. on Surg. in Trans. Am. Med. Assoc.</i> , 1851.
	Chloroform administered; on eighth day, wound seven-eighths healed; suppuration very trifling; went to school on fourteenth day after operation, and continued to do so during winter; specimen that of true osteosarcoma; joint healthy.	Dr. BRADBURY. <i>Bost. Med. and Surg. Jour.</i> , June 1852.
		Dr. FULLER, Norwich, Ct. Comm. by Dr. PARKER.

alluded to by authors, the result only being given. Of the successful cases, Orthon, Rossi, Hysem, Wedemeyer, Delauney, Laugenbrek, have each had single examples. Of unsuccessful cases, Ravaton, Graef, Pelletan, Velpeau, Gouraud, Vidal, Gensoul, have each had 1; Kerst 2, Dupuytren 3. These cases added to the foregoing make the whole number of operations on the continent 53; of which 20 were successful and 33 fatal, increasing the mortality before given to over 62 per cent.

Summary of the Cases in British Practice.—Whole number of operations, 25, of which 11 were successful, and 14 fatal; being a mortality of 56 per cent. *Sex*, 18 males, 5 females, 1 not given. *Age*, varying from 2 to 40. *Causes*, 11 were for severe injuries, including gun-shot wounds; of these 7 were primary amputations, of which 4 died and 3 recovered; 4 were secondary amputations, of which 2 died and 2 recovered; in 11 some chronic form of disease, of which 5 died and 6 recovered; 2 not given. *Previous amputation* of thigh in 5 cases, 1 died and 4 recovered.

Two died within twenty-four hours; 4 between 24 and 48 hours; the remaining 6 between the 5th day and 8th week.

Of those dying within 24 hours, 1 had uncontrollable hemorrhage in an exhausted system; 1 was in a most unpromising condition from the severity of the injury. Of those dying between 24 and 48 hours, 1 suffered severely from the shock of the operation, 1 primary amputation after a severe injury; 2 not given. Of those dying after the 5th day, 4 died from extension of previous disease, 1 had fever not depending on the operation; 1 had ascites. In 1 chloroform was employed, and with success.

The following cases, as in the preceding summary, being too deficient in details to be admitted into tables, may here be noticed. Those reported as successful are Dr. Millengen, 2; that of an English sailor at the battle of Aboukir; as unsuccessful, Mr. Thompson, Mr. Brodie, Mr. Brownrigg (2), Mr. Syme, and Mr. Liston.* These cases, added to those already given, make the whole number of British operations 34; of which 14 were successful and 20 unsuccessful, being a mortality of over $58\frac{3}{4}$ per cent.

Summary of Cases occurring in American Practice.—Whole number of operations 11, of which 8 were successful and 3 fatal, being a mortality of 1 in $2\frac{2}{3}$, or of $27\frac{3}{11}$ per cent.; 7 were males, 4 not noted. Age, varying from 10 to 43, majority under thirty, 4 not given. Cause in 5 cases was some chronic form of disease, of which 4 recovered and 1 died; 2 were severe accidents with primary amputation, both fatal within 48 hours; one painful affection of joint, cured; 3 not given; 2 followed previous amputation of thigh, both of which were successful. The operation in 3 cases was performed with lateral flaps, 1 successful, 2 fatal; in 3 cases with anterior and posterior flaps, all successful; in 1 by the circular

* Mr. Cox, in his Memoir, gives Mr. S. Cooper the credit of an unsuccessful case, but this is a mistake. This surgeon began the operation in a severe case of fracture of the femur by a grape-shot, and "immediately the soft parts had been divided, as the bone was broken to pieces, the limb came off, leaving the head of the bone, the trochanters, and a small piece below them projecting. Had not the man appeared in a very bad way by the time the vessels had been secured, I should now have removed the head of the bone; but the shock of the operation was such that he survived it but a few minutes, though scarcely any blood was lost."—*Surg. Dict., Art. Ampu.*

method, which was fatal; 4 not given. In 3 cases anæsthetics were employed, all successful; in 2, chloroform was used, in 1, chloric ether.

General Summary of the Operation of Amputation at the Hip-Joint.

	Whole No.	Died.	Cured.	Ratio of Mortality.	Per cent.
In Continental practice,	53	33	20		$62\frac{14}{33}$
In British “	34	20	14		56
In American “	11	3	8	1 in $2\frac{2}{3}$	$27\frac{3}{11}$
Total,	98	56	42		$57\frac{1}{7}$

Cause of Amputation in Sixty-two Cases.

	Severe Injuries.	Died.	Cur'd.	Per cent. of deaths.	Chronic Disease.	Died.	Cur'd.	Per cent. of deaths.
In Continental practice,	17	10	7	$58\frac{14}{17}$	16	10	6	$(2\frac{1}{2})$
In British “	11	6	5	$54\frac{6}{11}$	11	5	6	$5\frac{5}{11}$
In American “	2	2		100	5	1	4	0
Total,	30	8	12	60	32	16	16	50

